

B-8

## Production of TiO<sub>2</sub> Nanopowder from Ilmenite using DC Thermal Plasma Reactor

Snehamanjaree Samal, Dong-wha Park<sup>1</sup>, Hyungsun Kim<sup>†</sup>

School of Materials Science and Engineering, Inha University, <sup>1</sup>Department of Chemical Eng.  
(kimhs@inha.ac.kr<sup>†</sup>)

발표 취소되었습니다.

B-9

## Post Ru CMP Cleaning for Alumina Particle Removal

Y. Nagendra Prasad, Tae-Young Kwon, In-Kwon Kim, Jin-Goo Park<sup>†</sup>

Hanyang Univ., Department of Materials Engineering  
(jgpark@hanyang.ac.kr<sup>†</sup>)

The demand for Ru has been increasing in the electronic, chemical and semiconductor industry. Chemical mechanical planarization (CMP) is one of the fabrication processes for electrode formation and barrier layer removal. The abrasive particles can be easily contaminated on the top surface during the CMP process. This can induce adverse effects on subsequent patterning and film deposition processes. In this study, a post Ru CMP cleaning solution was formulated by using sodium periodate as an etchant and citric acid to modify the zeta potential of alumina particles and Ru surfaces.

Ru film (150 nm thickness) was deposited on tetraethylorthosilicate (TEOS) films by the atomic layer deposition method. Ru wafers were cut into 2.0×2.0 cm pieces for the surface analysis and used for estimating PRE. A laser zeta potential analyzer (LEZA-600, Otsuka Electronics Co., Japan) was used to obtain the zeta potentials of alumina particles and the Ru surface. A contact angle analyzer (Phoenix 300, SEO, Korea) was used to measure the contact angle of the Ru surface. The adhesion force between an alumina particle and Ru wafer surface was measured by an atomic force microscope (AFM, XE-100, Park Systems, Korea). In a solution with citric acid, the zeta potential of the alumina surface was changed to a negative value due to the adsorption of negative citrate ions. However, the hydrous Ru oxide, which has positive surface charge, could be formed on Ru surface in citric acid solution at pH 6 and 8. At pH 6 and 8, relatively low particle removal efficiency was observed in citric acid solution due to the attractive force between the Ru surface and particles. At pH 10, the lowest adhesion force and highest cleaning efficiency were measured due to the repulsive force between the contaminated alumina particle and the Ru surface. The highest PRE was achieved in citric acid solution with NaIO<sub>4</sub> below 0.01 M at pH 10.

**Keywords:** Ru CMP, Cleaning, Particle removal